

# The Obstetric Pathology of Poverty: Maternal Mortality in Kep Province, Cambodia

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## Abstract

**Purpose:** To conduct a baseline assessment study of maternal mortality in the province of Kep, Cambodia.

**Methods:** We evaluated maternal mortality in Kep using a structured questionnaire. The questionnaire was administered to women who were deemed the best respondents, and it included a verbal autopsy portion. The best respondent answered questions regarding a recent maternal death in the area, and the cause of death was identified.

**Findings:** Five maternal deaths were recorded in this study. Since 523 births were documented in the district for the last year, the maternal mortality rate for the province is 956/100,000. The cause of death for one woman was unknown. The other women most likely suffered from infection, eclampsia, postpartum hemorrhage and antepartum hemorrhage. The maternal mortality ratio may be an underestimate, given the stigma associated with reporting maternal deaths, especially when associated with traditional delivery practices.

## Introduction

The Millennium Development Goals (MDGs), the rubric upon which international public health governs itself, includes a goal that specifically calls for reducing the maternal mortality ratio by three-quarters between 1990 and 2015. The MDGs present an opportune time to re-think how maternal health is evaluated and improved (Freedman et al. 2005). The “obstetric pathology of poverty,” a

term used by Abdel-Aleem (1993), refers to the double trend of poor maternal health and increased risk of maternal death in developing countries when compared with that of females from more developed countries (Abdel-Aleem 1993). Over 530,000 women die each year from complications related to or exacerbated by pregnancy (WHO 2005). This is roughly equal to the number of lives lost if a jumbo jet crashed every four hours (Seim AR 2005). Further, about 90% of these deaths take place in developing countries (Kasonde 2000).

Cambodia is one of the poorest nations in the world, with a reported maternal mortality ratio of between 437/100,000 (Demographic and Health Survey [DHS] 2000) and 450/100,000 (WHO 2005). Maternal, neonatal and child health (MNCH) is a salient feature of primary healthcare and is currently one of the three main priorities stated in the National Primary Health Plan of the Cambodian Ministry of Health (MoH 2003). Patient registration for MNCH services at Cambodian healthcare centers has been studied extensively (RACHA 2000). However, a baseline assessment of maternal mortality and morbidity had yet to be conducted in Krong Kep province.

Krong Kep ("Kep") is a small province in the southwest of Cambodia. The 2003 population of Kep was estimated at 35,434 (MoH 2004). The objective of the study was to conduct a preliminary assessment of possible risk factors for maternal mortality in Kep, calculate a maternal mortality ratio for the area and evaluate how this figure compares with the nationally reported figure. In doing so, this study serves as a point from which studies could be conducted to further investigate the issue and suggest policy changes.

## Methods

### Defining a 'Maternal Death' – Inclusion Criteria

Maternal death was defined as the "death of a woman during pregnancy or 42 days after pregnancy, irrespective of the duration or site of pregnancy, from any causes that are related to or aggravated by pregnancy or its management, but not from accidental or incidental causes" (WHO 1992). The deceased woman must have resided in Krong Kep, with her death occurring between June 1, 2004 and June 1, 2005 in the referral hospital, health centers, villages or elsewhere in the Krong Kep municipality.

### Data Collection

We obtained official facts and figures for maternal mortality through interviews with personnel from the maternal health department at the MoH Operational District (OD) office for Kep. We were told that there were zero maternal deaths from June 1, 2004 to June 1, 2005, and 523 births.

After obtaining the official figures, we visited each village and asked pregnant or new mothers, passers-by, traditional birth attendants and village elders if they were aware of a maternal death in the area or in another village in Kep from June 2004 to June 2005. We asked 300 pregnant women and new mothers, as well as 13 traditional birth attendants, 9 village elders, and approximately 16 passers-by from June 13, 2005 to August 2, 2005.

If respondents told us they were aware of a maternal death, we asked if they could provide the name and location of a "best respondent" (BR) to consult about the death. The questionnaire was then administered to the best respondent. The verbal autopsy portion of the questionnaire allowed us to confirm that the inclusion criteria were met and to identify the cause of death as described by the BR. Using the official reported number of births for Kep and the number of maternal deaths identified, we estimated the maternal mortality ratio for Kep.

### Maternal Mortality Questionnaire/Verbal Autopsy

The questionnaire administered to the BR consisted of six sections: demographics, pregnancy history, information about last pregnancy, pre-pregnancy planning, verbal autopsy and additional comments. To meet the timeline and scope of this study, the verbal autopsy section was adapted from a questionnaire used for a study in Bangladesh by the Centre for Health and Population Research

(2005). The principal investigator validated the survey; the Centre for International Health (CIH) Program Manager and the OD Director approved it. The interpreter read the questionnaire to clarify any vague concepts and confirm that the concepts could be translated into Khmer. The survey was then pilot tested in Phnom Leav village.

The BR was identified by being most knowledgeable of the circumstances surrounding the death and was generally the sister of the deceased. As the official statistics (which reflect reporting by the birth attendant) for the Kep region imply underreporting of maternal deaths, it is not surprising that the birth attendant may not have been a BR for the death.

The first part of the questionnaire included descriptive and demographic questions about the deceased woman. Her age, number of children, educational level, income, occupation and age at first pregnancy were determined. Educational levels were divided according to the following categories: no education (illiterate), 1–3 years (partially illiterate), 4–6 years (literate, some primary education), 7–12 years (literate, some secondary education) and >12 years (postsecondary education). The questionnaire asked if the woman had a health record at the local health centre or referral hospital. The number of antenatal and postnatal visits (including administration of tetanus-toxoid vaccinations) during the woman's last pregnancy were sought. Her knowledge and practice of birth spacing, the number of stillbirths, miscarriages and abortions, gravidity and parity were determined. Lifestyle questions asked whether the woman used cigarettes, betel nuts and alcohol during pregnancy. The BR was asked who delivered the woman's last child (if she died after birth) or where she planned to go for her delivery (if she died during gestation). Questions were also asked about the baby, whether it was delivered alive, and for how long it lived after the mother died.

The second part of the questionnaire included a verbal autopsy component. This included questions regarding the gestational time or postpartum time at the mother's death and where she died. Healthcare-seeking behaviour of the deceased during pregnancy and her pregnancy history were recorded. Details about hemorrhaging were noted, as were the number of abortions and the approximate time of death. The remainder of the verbal autopsy report was separated into three sections that were consulted depending on whether the woman died before labour, during labour or after delivery.

### Data Recording and Analysis

As this was a preliminary study of maternal mortality, descriptive statistics were used. Data from interviews were recorded directly on individual copies of the questionnaire. After returning from the field each day, we recorded responses on Microsoft Excel spreadsheets. Data analysis was also completed using Microsoft Excel.

### Ethical Considerations

Upon our arrival in Cambodia, the proposal and questionnaire were reviewed by the Cambodian Ministry of Health. The study provided each interview subject with a letter of informed consent discussing the objectives of the study. BRs were reassured that no names would be used in the final report. As compensation for participating, the BRs received a toothbrush and toothpaste after completing the survey. Lastly, maternal health outreach and information sessions were given in the five most populous villages after data collection for the municipality was complete.

### Results

A total of five maternal deaths were recorded for Kep. Three of the BRs were sisters of the deceased, one was the husband and another was a close friend. The mean age of the deceased women was 34 years. The oldest was 41, while the youngest was 26.

The mean number of children per woman was five. Four of the deceased women were grand multiparous, as they had delivered more than five children. This is higher than the national fertility rate of 4.2 (DHS 2000). Three of the women were multigravida, with five or more pregnancies.

Each of the women came from a different village. One was from Kep Ville, which is only 1 km

from a health post, and one came from Damnakchangeur, which is 4 km from a health post. The others lived either 2 km or 3 km from a health post. Three of the women did not have a health record at a health centre or referral hospital, and two had made only one visit.

All of the BRs claimed that the deceased women did not earn enough money to support themselves and their family. This indicates that all were quite poor. The women had various levels of education. Only three were literate; one had no education, while the other had completed some primary school.

Most of the BRs were unaware of the number of antenatal care (ANC) visits made by the deceased woman during her pregnancy (see Table 1). Two women were reported to have received ANC at least once. Only one woman sought postnatal care (PNC) (see Table 1). Two women died during pregnancy or soon after delivery, and were thus unable to seek PNC.

**Table 1. ANC and PNC visits by the deceased women**

Number of Antenatal Visits	# Subjects
Don't know	3
1 visit	2
Total	5
Number of Postnatal Visits	
Not applicable	2
None	2
1–2 visits	1
Total	5

Most of the women had never had an abortion. Only one woman was known to have had an abortion during her lifetime, while another respondent was unsure if the deceased had had an abortion (see Table 2).

**Table 2. Incidence of abortion**

Had One Abortion	Don't Know	Never Had an Abortion
1	1	3

One mother died after about four months of gestation, while four died after delivering the child. One died after 24 hours, another after seven days, and the last 40 days after giving birth (Figure 1).

Among those women who died after delivery, half were attended by a traditional birth attendant (TBA). One of the TBAs was confirmed to have had some training (see Figure 2). One deceased woman was attended by a midwife and the other by a doctor. Three of the babies were delivered alive. One woman had miscarried during the gestational period, while the other had a stillbirth. Of the babies delivered alive, one died at one month of age, and two were alive at the time of the study.

Figure 1. Time of death

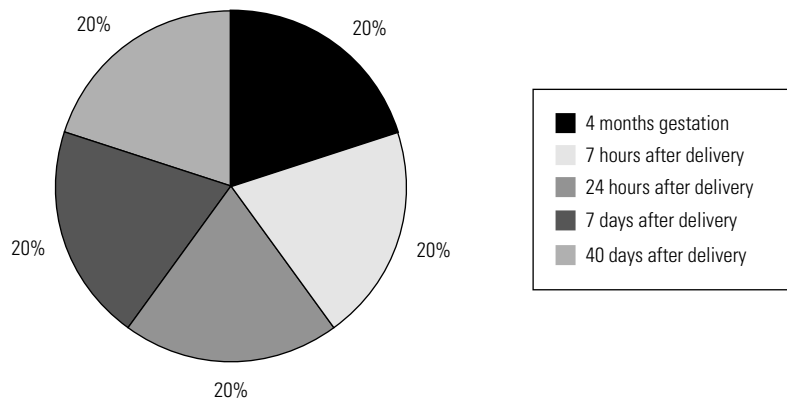
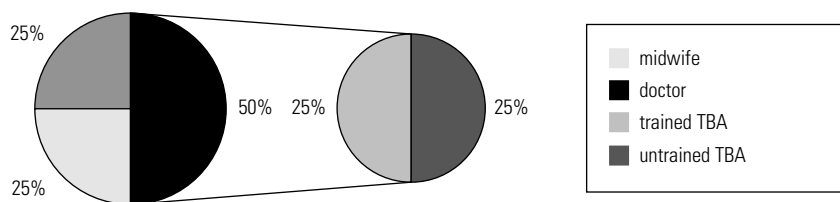
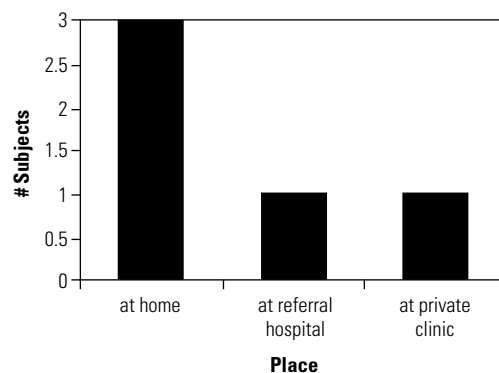


Figure 2. Delivery personnel



Three of the women died at home, while the others died at the referral hospital or private clinic, as seen in Figure 3. When asked why the women were not transferred to the hospital, BRs gave lack of money and time as two reasons (see Table 3). One BR claimed that the subject was transferred home, since nothing could be done at the hospital. The husband attended the deaths of four women; relatives attended two. One death was also attended by the children, and another by a midwife.

Figure 3. Place of death

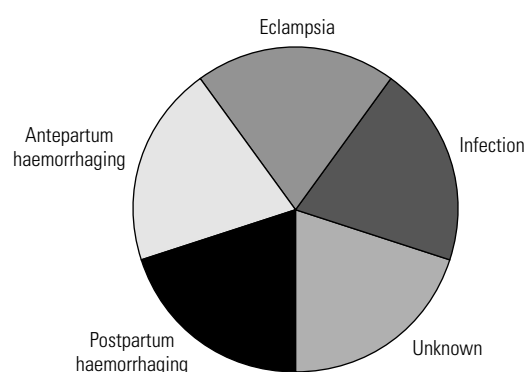


After analyzing the symptoms and data from the verbal autopsy portion of the questionnaire, we deemed that each woman had died from a different obstetrical cause. The likely causes of the five maternal deaths are seen in Figure 4.

Table 3. Reasons for death at home,  $n = 3$ 

If she died at home, why wasn't she taken to hospital?	# Subjects
No money	1
Not enough time	1
Taken from hospital to die at home	1
Total	3

Figure 4. Probable causes of death



### Maternal Mortality Ratio for Krong Kep

Given the following figures, the Maternal Mortality Ratio (MMR) can be calculated:

# of live births within the last year: 523

# of maternal deaths from June 2004 to June 2005: 5

$$\text{MMR} = (5/523)(100,000)$$

$$= 956.0$$

The MMR for Krong Kep is therefore **956/100,000**.

### Discussion

The purpose of the present study was to provide a descriptive assessment of the picture of maternal mortality in Krong Kep, Cambodia, through the use of a novel method of ascertaining maternal deaths. Since this is a preliminary assessment of the issue in Kep, further study is needed to solidify evidence to affect policy change. Due to the small sample size and descriptive nature of the study, the results serve primarily to assess the issue in Kep, though it is likely that the findings from this study might be relevant to other areas of Cambodia.

Though Demographic Surveillance Site (DSS) data and the sisterhood method are often used to measure maternal mortality, they have various drawbacks (Shahidullah 1995). Moreover, verbal autopsies vary in quality (Chandramohan 1994). The method we used may be an appropriate way to assess maternal mortality on a small scale, such as at the village level. It is a variation on the "community inquiry" approach used by Kumar and colleagues (1989). It assumes that communities are in a constant dialogue about various vital events in the area, and it may be quite accurate in rural areas, especially tight-knit communities such as Kep. The advantage to the approach used here is that a large number of pregnant women or new mothers were consulted from various villages in Kep. We also acknowledged that pregnant women may have the most knowledge about recent maternal deaths, as they likely have access to anecdotal information that may pertain to their own welfare. The

approach described here may also borrow from principles of the sisterhood method, which assumes that sisters (or close female friends for that matter) would be more likely to know about the death of another female, particularly if it happened during pregnancy or after delivery. Indeed, the best respondent in this study tended to be the sister or close female friend in most cases.

A total of five deaths were reported. This is clearly a departure from the official number of zero deaths given by the Operational District office. This may often be the case, as was shown in a Jamaican study, where careful analysis indicated a maternal mortality ratio twice that of the official figures (Walker et al. 1986). Cambodia has a very weak vital registration system, especially in rural areas, and this may lead to underreporting of both births and deaths. Much of this underreporting may be by the birth attendant, perhaps due to the stigma and feared repercussions associated with reporting such deaths.

Two of the deceased women may be considered high risk, as they were over the age of 35 when they gave birth. This is often cited as the age at which special precautions should be taken during delivery, due to the higher risk of complications, particularly related to anemia, hemorrhage and eclampsia. The fact that most of the women were multiparous is not surprising, as this also tends to add to the risk of obstetric complications. Other research has also commented on the link between age, parity and maternal mortality (Walker et al. 1986). Further study is required to examine the link between these risk factors and maternal mortality in Kep.

The “three delays” for maternal care are (a) delay the decision to seek care, (b) delay of arrival at health facility and (c) delay the provision of care (Thaddeus and Maine 1994). These delays are largely influenced by poverty and distance from a health post. This study found that poverty may be a risk factor for maternal death, as most of the deceased women lived relatively far from a health post. This was also found in a recent study in Afghanistan, where socioeconomic status and the inability to pay for care before, during and after delivery were linked to maternal mortality (Bartlett et al. 2000). However, the relationship between socioeconomic status and ability to seek care is not a simple one (Thaddeus and Maine 1994). Further, due to the small sample size and descriptive nature of our study, firm conclusions about the effect of distance and poverty on maternal mortality cannot be made.

Our study found that more women sought antenatal care than postnatal care, supporting the idea that postnatal care is often neglected (Lijstrand 2000). However, ANC use was still low, similar to another study in Cambodia (Zafar 2003). It is likely that the decision to seek ANC and PNC is affected by some of the aforementioned barriers to healthcare. That only two women were known to have received ANC at least twice may indicate the salience of such care to help prevent obstetric complications. Indeed, improvements in maternal care may be more important determining factors of maternal health than higher standards of living (Loudon 2000). Yet it is crucial that the role of ANC and PNC be evaluated on a larger scale in Kep to determine if there is an association with maternal mortality.

It is likely that the number of abortions was underreported in this study due to stigma associated with the practice. Further, the woman in our study reported to have had an abortion may have opted for a clandestine procedure. One study found that unsafe abortion accounts for at least 13% of maternal mortality (Khan et al. 2006). Further, abortion deaths are generally biased downwards and misclassified as hemorrhage or sepsis (Khan et al. 2006). Safe abortion practices require changes at policy level and abortion training (Berer 2000). This is not a new idea, and it was asserted most notably at the International Conference on Population and Development in Cairo in 1994.

It is not surprising that a TBA attended half of the women who died after delivery. Though one TBA may have been described as trained, it is difficult to assess the quality and amount of training given. The use of skilled personnel is a contentious issue within the field of maternal health. It has been pointed out that most health personnel in developing countries tend to work in urban areas (Mavalankar and Rosenfield 2005), and this contributes to the lack of skilled personnel in rural areas. This lack has been linked to the risk of maternal death in Cambodia (Chatterjee 2005). It is important to note that two women were indeed attended by skilled personnel, but still suffered the

same fate as the women who delivered at home. This may indicate the importance of various other factors in preventing maternal death, such as antenatal and postnatal care.

The causes of maternal death were identified after the verbal autopsy interview with the BR. Convulsions were described in one case, which, along with other symptoms, led us to speculate that the woman may have died from eclampsia. Hemorrhaging was linked to “severe” bleeding either before or after delivery. Infection was given as one cause of death. One case was unknown. This corresponds to the finding that severe bleeding is responsible for 25% of maternal deaths, infection (or sepsis) accounts for 15% and eclampsia for 12% (Goodburn and Campbell 2001). The finding that two women most likely suffered hemorrhage supports the evidence proposed by Khan and colleagues (2006) that hemorrhage and anemia are important causes of maternal death. Further studies in Kep should aim to include a larger sample size to validate our findings regarding causes of maternal death.

Using the methods described in this study, the MMR value for Krong Kep was calculated to be 956 deaths for every 100,000 live births, which is almost double the national figures, and higher than the absolute number of maternal deaths given by the OD office for Kep. Underreporting, as mentioned earlier, may have been an issue, and it is quite possible that other maternal deaths occurred within the specified time frame and were not reported to the researcher. This is especially true for deaths that may have occurred very early in pregnancy. The underestimate may be exacerbated by the tendency to underreport deaths in Cambodia (Chan 1999). Taboos surrounding the topic of death in communities may be one reason why no maternal deaths were reported to the OD office. It is hoped that villagers will be encouraged to report such deaths to increase the level of awareness of maternal health at the district and national level. Further, the number of live births in a given year (as obtained by the OD office) may be an underestimate, given that many births occur at home and may not be registered. This further leads us to hypothesize that our MMR figure is an underestimate.

The MMR is difficult to measure, especially in areas with weak vital registration (Berhane et al. 2000). The WHO has emphasized that all values of MMR be viewed with a degree of uncertainty (WHO 2005). This may be due to several factors, including the methods used to obtain MMR. The household method, sisterhood method, Reproductive Age Mortality Survey (RAMOS) and statistical modelling each yield different MMR figures and have their own strengths and weaknesses.

A few limitations were identified in this study. First, translation barriers may have led to some inaccuracies during data collection. However, every effort was made to field test the questionnaire and explain the concepts to the interpreter prior to implementation. When confusion arose during the interview, concepts were explained further. Second, certain cultural taboos are associated with death, and this may have affected the responses of the BR. Often, pregnant women are discouraged from speaking about the topic for the fear of bringing harm to their own baby (Geisbrecht 2004). Third, some TBAs may have refused to report a death for fear of being blamed. This occurred in one instance, as a TBA denied knowledge of a death even after it was found that she assisted a delivery that ended in the mother's death shortly thereafter. Fear of blame also contributes to underreporting deaths to the OD office. Fourth, the causes of maternal mortality as identified by our study were not triangulated with other methods for determining cause of death. Last, a larger sample size, obtained through a prospective study, may allow these results to be generalized, and allow for a deeper analysis of risk factors for maternal mortality in Kep. These points serve as appropriate points for future study regarding maternal health in Krong Kep.

## Conclusion

The “obstetric pathology of poverty” has been described as an ever-increasing problem in poor nations of the developing world. This issue is nowhere more evident than in Cambodia. In the Western Pacific Region, 40% of maternal deaths occur in only six countries, which account for 10% of the population (Ruyan 1999). Cambodia is included in this list, and it is thus not surprising that a high maternal mortality ratio was found in Kep. Today, a woman's risk of dying from pregnancy-



related causes in the poorest nations is higher than a century ago in the richest nations (Graham 2002). It is crucial that new strategies be adopted with the aim of increasing access to healthcare for expectant mothers. Though encouraging institutional delivery remains as one pillar to decrease maternal mortality, this study implies that skilled delivery may not be sufficient by itself, and that ANC and PNC should be encouraged to identify and treat high-risk women. Other studies (Chan 1999; Koblinsky et al. 1999) recommend emergency obstetric be available care as well. However, due to the small sample size and descriptive nature of this study, solid recommendations cannot be made. Indeed, maternal mortality is one of the gravest human rights violations; preventing and reporting the thousands of unnecessary maternal deaths that occur each year in developing countries should become a priority.

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